

WHAT IS CLAIMED IS:

1. A semiconductor laser device for emitting a plurality of laser beams having different wavelengths, comprising:

5 a first laser part occupying a predetermined area; and

a second laser part formed on a semiconductor substrate, said second laser part occupying an area greater than that of said first laser part, wherein

a side of said second laser part opposite from said
10 semiconductor substrate and a side of said first laser part closer to its light-emitting part are bonded by a conductive adhesive layer, and

said first laser part bonded to said adhesive layer has a multilayer structure in which thin films of group-III nitride
15 compound semiconductors containing at least one of aluminum (Al), gallium (Ga), and indium (In), and nitrogen (N) are stacked.

2. The semiconductor laser device according to claim 1, wherein:

20 a conductive layer in electric connection with said adhesive layer is formed on an exposed surface of said second laser part as seen from the side of said first laser part, said exposed surface resulting from a difference between the areas occupied by said first and second laser parts; and

25 said conductive layer functions as a current supply part for supplying drive currents for driving said first and second laser parts.

3. The semiconductor laser device according to claim 2, wherein said conductive layer is said adhesive layer extended along a principle plane of said second laser part.

5

4. The semiconductor laser device according to claim 3, wherein said adhesive layer has a step such that a portion of said conductive layer lies closer to said semiconductor substrate than its portion interposed between said first and second laser parts
10 does.

5. The semiconductor laser device according to claim 2, wherein:

said adhesive layer is bonded to said second laser part via
15 an ohmic electrode layer formed on said second laser part; and
said conductive layer is said ohmic electrode layer extended along a principle plane of said second laser part.

6. The semiconductor laser device according to any one of
20 claims 1-5, wherein:

said semiconductor substrate is a GaAs substrate; and

said second laser part has a multilayer structure in which thin films of group III-V compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium
25 (Ga), and indium (In), and at least one selected from the group consisting of arsenic (As), phosphorus (P), and antimony (Sb) are stacked.

7. The semiconductor laser device according to claim 3 or 4, wherein a support substrate is bonded onto said first laser part and an exposed portion of said adhesive layer facing toward said first laser part.

8. The semiconductor laser device according to claim 5, wherein a support substrate is bonded onto said first laser part and an exposed portion of said ohmic electrode layer facing toward said first laser part.

9. A method of manufacturing a semiconductor laser device having a first laser part and a second laser part for emitting laser beams of different wavelengths, the method comprising:

15 a first step of stacking thin films of group-III nitride compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium (Ga), and indium (In), and nitrogen (N) on a sapphire substrate to fabricate said first laser part, and forming a first adhesive layer on said first laser part to fabricate a first intermediate;

20 a second step of stacking thin films of group III-V compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium (Ga), and indium (In), and at least one of arsenic (As), phosphorus (P), and antimony (Sb) on a GaAs substrate to form second laser parts protruding from the surface of said GaAs substrate, said second laser parts each having a multilayer structure of said thin films, and forming a second

adhesive layer all over said protruding second laser parts and said GaAs substrate where said second laser part is not formed, thereby forming a second intermediate for forming second light-emitting elements;

5 a third step of bonding said first adhesive layer and said second adhesive layer lying on said second laser parts so that waveguides of said first laser part lie close to waveguides of said second laser parts, thereby fabricating a third intermediate having said first laser part and said second laser parts bonded to each
10 other through the interposition of an adhesive layer;

 a fourth step of irradiating a junction between said sapphire substrate and said first laser part with light to be transmitted through said sapphire substrate and absorbed by the group-III nitride compound semiconductors, so that said first laser part in the vicinity
15 of the junction is decomposed, and portions of said first laser part corresponding to regions where said first and second adhesive layers are not in contact are broken;

 a fifth step of removing said sapphire substrate from said third intermediate to expose said first laser part and said second
20 adhesive layer lying on said GaAs substrate; and

 a sixth step of cleaving said third intermediate after the removal of said sapphire substrate, and dividing the resultant where said second adhesive layer is exposed, thereby fabricating semiconductor laser devices each including a first light-emitting
25 element having said first laser part and a second light-emitting element having said second laser part.

10. A method of manufacturing a semiconductor laser device having a first laser part and a second laser part for emitting laser beams of different wavelengths, the method comprising:

a first step of stacking thin films of group-III nitride compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium (Ga), and indium (In), and nitrogen (N) on a sapphire substrate to form said first laser part, and forming an adhesive layer on regions of said first laser part along waveguides thereof to fabricate a first intermediate, said regions including said waveguides;

a second step of stacking thin films of group III-V compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium (Ga), and indium (In), and at least one selected from the group consisting of arsenic (As), phosphorus (P), and antimony (Sb) on a GaAs substrate to form a second laser part, and forming a second adhesive layer all over said second laser part to fabricate a second intermediate;

a third step of bonding said first adhesive layer and said second adhesive layer so that said waveguides of said first laser part lie close to waveguides of said second laser part, thereby bonding said first laser part and said second laser part through the interposition of an adhesive layer solidified and fabricating a third intermediate in which part of said second adhesive layer is not bonded to said first laser part;

a fourth step of irradiating a junction between said sapphire substrate and said first laser part with light to be transmitted through said sapphire substrate and absorbed by the group-III nitride

compound semiconductors, so that said first laser part is decomposed in the vicinity of the junction, and regions of said first laser part where said first adhesive layer is not formed are broken;

5 a fifth step of removing said sapphire substrate from said third intermediate to expose said first laser part and portions of said adhesive layer corresponding to said broken regions of said first laser part; and

10 a sixth step of cleaving said third intermediate after the removal of said sapphire substrate, and dividing the resultant where said adhesive layer is exposed, thereby fabricating semiconductor laser devices each including a first light-emitting element having said first laser part and a second light-emitting element having said second laser part.

15 11. A method of manufacturing a semiconductor laser device having a first laser part and a second laser part for emitting laser beams of different wavelengths, the method comprising:

20 a first step of stacking thin films of group-III nitride compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium (Ga), and indium (In), and nitrogen (N) on a sapphire substrate to form said first laser part, and forming a first adhesive layer on said first laser part to fabricate a first intermediate;

25 a second step of stacking thin films of group III-V compound semiconductors containing at least one selected from the group consisting of aluminum (Al), gallium (Ga), and indium (In), and at least one selected from the group consisting of arsenic (As),

phosphorus (P), and antimony (Sb) on a GaAs substrate to form said second laser part, forming an ohmic electrode layer of metal all over said second laser part, and forming an adhesive layer on regions of said second laser part along waveguides thereof to fabricate
5 a second intermediate, said regions including said waveguides;

a third step of bonding said first adhesive layer and said second adhesive layer to each other, thereby fabricating a third intermediate in which said first laser part and said second laser part are bonded to each other through the interposition of an adhesive
10 layer;

a fourth step of irradiating a junction between said sapphire substrate and said first laser part with light to be transmitted through said sapphire substrate and absorbed by the group-III nitride compound semiconductors, so that said first laser part is decomposed
15 in the vicinity of the junction, and portions of said first laser part corresponding to regions where said second adhesive layer is not formed are broken;

a fifth step of removing said sapphire substrate from said third intermediate to expose said first laser part and portions
20 of said ohmic electrode layer corresponding to said broken portions of said first laser part; and

a sixth step of cleaving said third intermediate after the removal of said sapphire substrate, and dividing the resultant where said ohmic electrode layer is exposed, thereby fabricating
25 semiconductor laser devices each including a first light-emitting element having said first laser part and a second light-emitting element having said second laser part.

12. The method of manufacturing a semiconductor laser device according to claim 9 or 10, comprising a seventh step of bonding an exposed surface of said first laser part and an exposed surface of said adhesive layer onto a support substrate, the seventh step following the sixth step.

13. The method of manufacturing a semiconductor laser device according to claim 11, comprising a seventh step of bonding an exposed surface of said first laser part and an exposed surface of said ohmic electrode layer onto a support substrate, the seventh step following the sixth step.